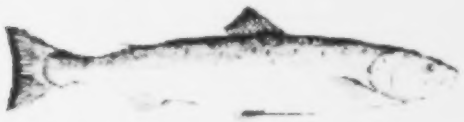

ATLANTIC SALMON

LABRADOR SALMON FISHING AREAS 1, 2, AND 14B

Background

There are 19 Scheduled Salmon rivers in Labrador, although there are many other rivers which contain populations of Atlantic salmon. River- specific stock assessments were conducted for two rivers: Sand Hill River and Pinware River (Fig 1). A fish counting fence was operated on Sand Hill River each year 1994 to 1996, and an adult salmon mark-recapture project was attempted on the Pinware River for the first time, in 1996. Most rivers in Labrador contain 2SW salmon stocks with a freshwater age of 3 to 7 years. Salmon produced in Labrador have historically been harvested in the commercial fisheries at West Greenland, Newfoundland, Labrador and possibly North Shore of Quebec. The total production of small salmon (< 63 cm in fork length) in Labrador has ranged from a high of about 229,000 in 1981 to a low of about 44,000 in 1994. Overall production while increasing has remained relatively low since 1991. The production of large salmon (≥ 63 cm in fork length) has declined from about 228,000 in 1976 to a low of 24,000 in 1991. Record low populations persisted from 1991 to 1995. The number of small and large salmon spawners required to meet conservation egg deposition requirements have been derived by applying a ratio of 0.4 spawners per recruit for small salmon and 0.3 spawners per recruit for large salmon, to an estimate of the average production of small and large salmon in 1974-78. There is insufficient information available on parr rearing habitat and productivity to determine egg deposition requirements based on available habitat.

Figure 1. Map of Labrador showing the locations of Salmon Fishing Areas 1, 2 and 14B and assessment facilities: (1) Sand Hill and (2) Pinware rivers.

The Fishery

Atlantic salmon are harvested in commercial and recreational fisheries; as well, some salmon are caught as a by-catch in a food fishery and in commercial fisheries for other species. There were 218 fishers licensed to fish salmon commercially in 1996, which is 38% of the number of fishers licensed in 1991. Only about 125 fishers actually participated in the 1996 commercial salmon fishery.

The commercial fishing season opened on June 20 in 1996 under a total quota of 55 t. Salmon were caught during the first day of the fishery which indicates an early run compared to recent years, probably due to warmer marine environmental conditions.

There were 48 t of salmon landed in the commercial fishery, which is 87% of the quota (55 t) for all SFAs (Fig 2). The highest landings (large plus small) recorded were 853 t in 1981.

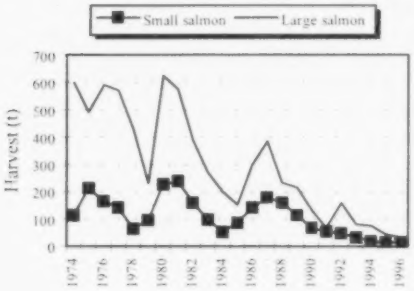

Figure 2. Labrador commercial landings of large and small salmon, 1974-96.

The quota (14.5 t) in SFA 1 was not caught; the landings (9 t) of small and large salmon were the lowest recorded (Fig. 3 and 4). In SFA 2 the quota (35.5 t) was divided into three subdivisions, and all had attained their quota by July 10. The quota (5 t) for SFA 14B was not reached; and the landings (4 t), although higher than in 1995, were the second lowest recorded.

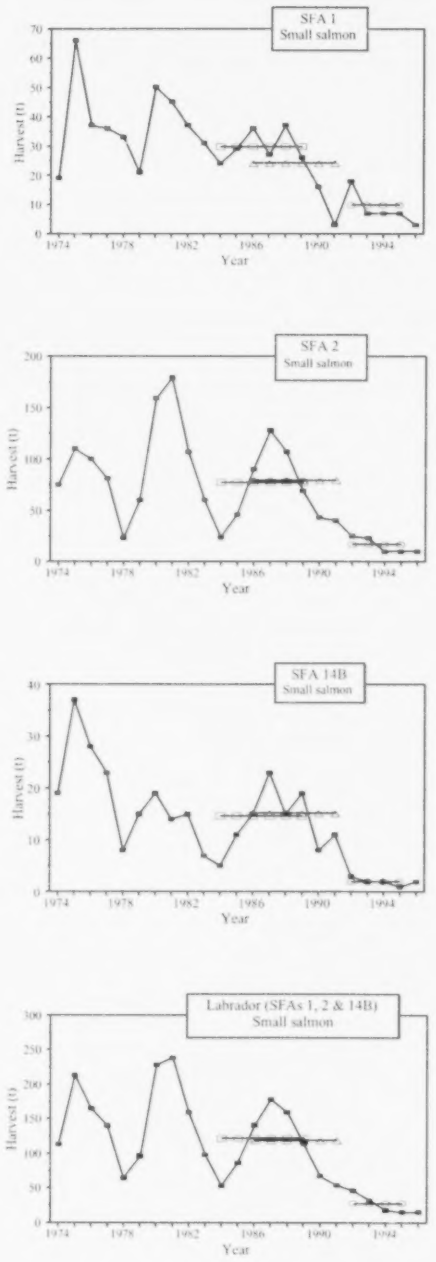

Figure 3. Commercial landings of small salmon in SFAs 1, 2, and 14B separately and combined, 1974-96. Open square is the 1984-89 mean, triangle is the 1986-91 mean, and open circle is the 1992-95 mean.

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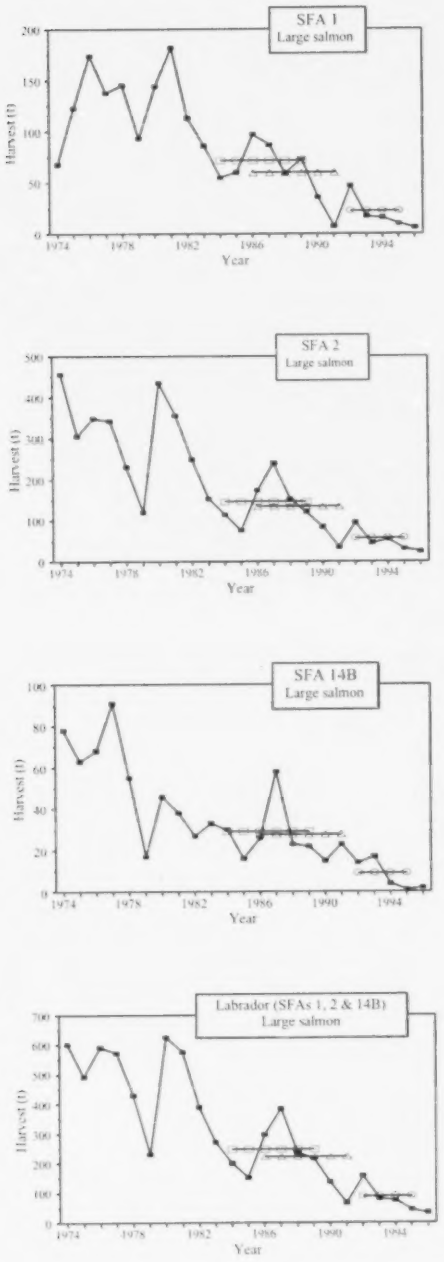

Fig 4. Commercial landings of large salmon in SFAs 1, 2, and 14B separately and combined, 1974-96. Open square is the 1984-89 mean, triangle is the 1986-91 mean, and open circle is the 1992-95 mean.

Table 1. Percentage of the commercial fishery quota which was caught and quotas in each SFA since 1990.

Year	SFA 1 (quota)	SFA 2 (quota)	SFA 14B (quota)	SFAs 1, 2, 14B (quota)
1990	65% (80)	64% (200)	38% (60)	59% (340)
1991	13% (80)	38% (200)	227% (15)	41% (295)
1992	83% (80)	67% (180)	131% (13)	75% (273)
1993	31% (80)	76% (90)	238% (8)	63% (178)
1994	96% (24)	107% (60)	75% (8)	101% (92)
1995	79% (19)	79% (48)	31% (6.5)	76% (73.5)
1996	62% (14.5)	99% (35.5)	80% (5)	87% (55)

There were no recreational catch statistics collected in SFA 14B in 1996 and, therefore, there is no overall total for Labrador. However, the number of small salmon retained in SFAs 1 and 2 in 1996 was the highest since 1991, but was still less than the average retained catch from 1984 to 1990 (Fig. 5). The number of large salmon retained in these SFAs in 1996 decreased slightly from the previous two years (Fig. 5). If released catches were added to the retained catches, then for both small and large salmon, the total recreational catches in 1996 would be either the highest (small salmon) or among the highest (large salmon) recorded. The numbers of small (322) and large salmon (67) angled in SFA 1 were the lowest since 1993. The recreational catch (retained and released) of small salmon (4,599) in SFA 2 in 1996 was 53% higher than the catch in 1995 and 74% higher than the average catch for 1992-95. The large salmon catch (551) in SFA 2, 1996, was 18% higher than the catch in 1995, but 73% higher than the average catch for 1992-95. The proportion of salmon released by anglers has increased each year since 1992. In 1996, 54% of the catch of small salmon and 51% of the large salmon were released.

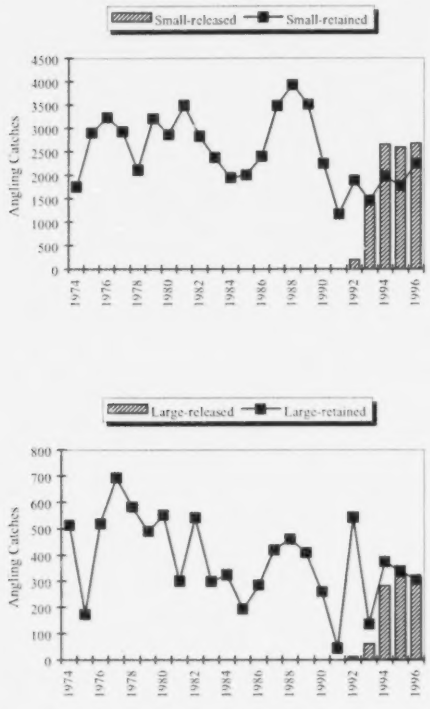

Fig 5. Recreational catches of large and small salmon in SFAs 1 and 2, 1974-96.

It was estimated that Greenland harvested about 3,700 salmon in 1995 which would have returned to Labrador in 1996 if they had not been caught.

Resource Status

Returns

An exploitation model was used to estimate the total population size of small and large salmon of Labrador origin, prior to harvest in the commercial fisheries and including Labrador origin salmon caught at west Greenland. The estimated production in 1996, was 36,320 large and 118,673 small salmon. The population of large salmon declined from 227,875 in 1976 to 24,336 in 1991, and has remained relatively stable between 30,100 and 48,300 since 1992 (Fig. 6). All estimates of population sizes are mid-points of a minimum and maximum range of estimates. This range is wide resulting in uncertainty in the application of a point estimate.

The trends in abundance of large and small salmon are dominated by the relatively more productive salmon stocks in SFA 2, which mask the apparent low stock levels in SFAs 1 and 14B.

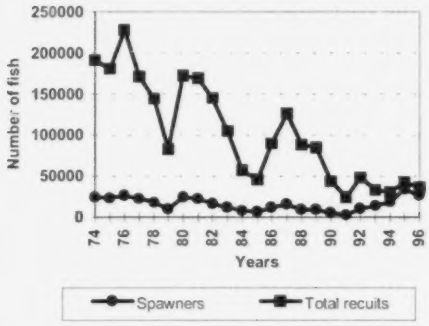

Figure 6. Total production (recruits) of Labrador origin large salmon and numbers of spawners 1974-96. Total recruits includes fish caught at West Greenland and in Canadian commercial fisheries, recreational fisheries, and in the spawning escapement.

The population of small salmon declined from a high of 229,481 in 1981 to an estimated low of 43,572 in 1994; subsequently the population has increased to 118,673 fish in 1996 (Fig. 7).

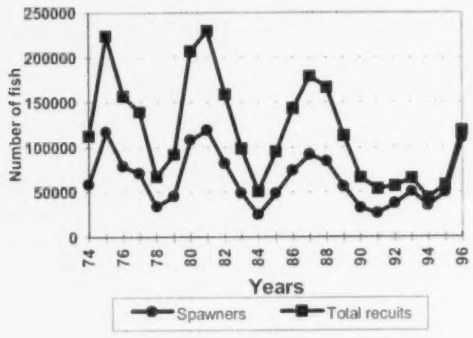

Figure 7. Total production (recruits) of Labrador origin small salmon and numbers of spawners 1974-96. Total recruits includes fish caught in Canadian commercial fisheries, recreational fisheries, and in spawning escapement.

A fish counting facility was operated on Sand Hill River from 1969 to 1973 and again from 1994 to 1996. There were 3,319 small and 414 large salmon estimated to have returned to Sand Hill River in 1996. The total production for Sand Hill River, estimated from commercial exploitation rate in 1996 was 3,412 small and 648 large salmon. The total production and returns to the river of small salmon increased over 1994 and 1995, but declined for large salmon. The estimated large salmon production in 1996 was the lowest recorded in the time series and is only 10% of the estimated average production from 1970 to 1973, which is the only previous period for which counts of salmon are available (Table 2). However, the returns of large salmon to the river in 1996 was 53% higher than the average returns for 1970-73. The returns of small salmon to the river in 1996 was 5% less than the average returns for 1970-73.

Table 2. Estimates of total production of salmon from Sand Hill River and estimates of returns to the river.

Year	Total Production		Returns to River	
	Large	Small	Large	Small
1970	3469	6173	138	3600
1971	6687	6167	266	3596
1972	4399	3495	175	2038
1973	12670	8164	504	4761
1994	1525	2503	730	2180
1995	839	3090	560	2796
1996	684	3412	414	3319
Avg 70-73	6806	6000	271	3499

An attempt was made to estimate the population size of salmon in the Pinware river in 1996 using a mark-recapture technique. However, only a small number of salmon were captured (87) and tagged (48). Since only four tagged salmon were recaptured there is considerable uncertainty around the population estimate (1,967 - 6,147). The low number of salmon caught in the two estuarine traps indicates the overall population size is small.

Egg deposition relative to conservation

There are insufficient data on accessible parr rearing habitat in Labrador rivers to derive conservation egg deposition requirements, except for Pinware and Forteau rivers. Estimates of parr rearing habitat had previously been obtained for Sand Hill River and used in previous years to calculate egg deposition requirements. But the amount of available habitat estimated per km^2 for Sand Hill River compared to other rivers, indicated that the estimate for Sand Hill River may be an over-estimate. Therefore, no conservation egg deposition requirements should be used until the habitat survey has been verified, including the presence or absence of parr in the upper watershed.

In the absence of adequate estimates of available parr rearing habitat, the number of spawners required for conservation for all of Labrador was estimated by assuming that: a)

approximately one large salmon spawner is required to produce three large salmon recruits (adult salmon), and b) approximately one small salmon is required to produce 2.5 small salmon recruits. Thus, it is assumed that 30% of the production of large salmon and 40% of the production of small salmon (1974-78) is required for conservation. The estimated spawner requirements for conservation for Labrador (SFAs 1, 2 and 14B combined) are shown below:

	No. of salmon
Small	42,800
Large	48,200
Total	91,000

The estimated number of large salmon spawners in 1996 was 27,150 which was 20% lower than in 1995; however it was 165% higher than the average numbers from 1986 to 1990 (Fig. 6). The abundance of large salmon spawners in 1996 was the second highest estimated since 1974; the highest estimate was in 1995. The increase was primarily due to restrictions placed on the commercial fisheries. Large salmon spawners in 1996 were about 55% of the estimated conservation requirements compared to about 70% in 1995.

The estimated number of small salmon spawners in 1996 was 110,663, which was 123% higher than in 1995 and 64% higher than the average spawning escapement for 1986-90 (Fig. 7). The estimated small salmon spawners in 1996 was the highest since 1981; and was 259% of the estimated small salmon conservation requirements. The increase in small salmon spawners appears to have resulted from an increase in production and a reduction in commercial exploitation.

Environmental Considerations

A water discharge station on the Eagle River (SFA 2) indicated that water flows in June were 71% below normal, but increased to 140% above normal for July, with normal conditions experienced in August. In the marine environment, the ice retreated earlier than normal along the southern Labrador coast (SFAs 2 and 14B) which resulted in an early migration of salmon along the coast. Severe ice conditions existed along the coast of northern Labrador (SFA 1) and persisted into August.

Outlook

Short-term

The returns of large salmon in Labrador in 1997 and 1998 are expected to be less than the returns in 1996, whereas the returns of small salmon are expected to remain similar to the returns in 1996. These expected returns are based on the low egg depositions in 1989, 1990, and 1991, and assume no increase in natural survival rates. However, there does appear to be some improvement in marine environmental conditions in the northwest Atlantic Ocean which may result in an improvement in natural survival. There is no technique currently available to forecast changes in natural survival rates.

The salmon stocks in SFA 14B still appear to be at very low levels and are not expected to improve substantially over the next life cycle.

Long-term

The increased spawning populations in 1992-96 should result in increases in adult salmon production in years from 2000 onwards.

Management Considerations

The absence of angling catch statistics in SFA 14B greatly affected the evaluation of changes in population sizes and status of salmon stocks. However, it does appear that the salmon stocks in SFA 14B are still in critical condition and further reductions in fishing mortality are warranted. The populations of large salmon in SFA 2 remain low; however, the spawning stock appears to have increased substantially since 1992 which should result in improved production in future years. Fishing mortality on large salmon in SFA 2 should not be increased in 1997. Reports from fishermen indicate that there is a large by-catch of salmon in trout and food fishing gear. This mortality should be reduced. In SFA 1, the landings were affected by severe ice conditions which delayed migration of salmon along the coast and may have resulted in higher than usual harvests of SFA 1 origin salmon in the commercial fishery in SFA 2. Fishermen and anglers support the conclusion that stocks in SFA 1 are at low levels, and therefore, no increases in fishing mortality should be considered. The absence of adequate field stock assessment projects in Labrador results in some uncertainty in the estimates of abundance and forecasts.

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Reddin, D.G., P.B. Short and R.W. Johnson. 1997. Atlantic salmon stock status for Sand Hill River, Labrador, 1996. DFO, CSAS Res. Doc. 97/44.

This report is available:

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STOCK: Sandhill River (SFA 2) **Drainage area**: 1276 km^2 (accessible)

Year	1990	1991	1992	1993	1994	1995	1996	MIN[1]	MAX[1]	MEAN[1]
Total returns:[2]										
Small					2180	2796	3319	2038	4761	3184
Large					730	560	414	138	730	398
Recreational harvest										
Small (retained)	372	197	448	258	279	289	321	100	702	372
Large (retained)	38	18	25	12	29	28	20	2	94	25
Small (released)			0	309	326	340	702	0	702	335
Large (released)			0	10	7	14	36	0	36	13
Other mortalities										
Small										
Large										
Spawners:[3]										
Small					1868	2472	2927	1819	4242	2900
Large					701	531	390	136	701	383
Conservation requirement % eggs met:[4]										
Smolt count								37007	55000	47556
Sea survival								4.6	6.9	5.8

[1] Min, max and mean for total returns are for all available years, recreational harvest (retained) for calculated period 1974-91, recreational harvest (released) for 1992-96, smolt counts for 1970-73 and sea survival for 1970-71. Prior to 1992 angling statistics for hook and released were not collected.

[2] Total returns are for the period 1970-73 and 1994-96. Values in this table have been updated from 1995.

[3] Hook and release mortality is 10% of released salmon

[4] See Accessible habitat below.

Recreational catches: Catches have ranged from 122 to 785 during the period 1974-96. The number of small salmon retained in 1996 was 321 and 702 were released. The number of large salmon retained was 20 and 36 were released.

Data and assessment: Complete counts of smolt and adult salmon migrations were obtained from portable fish counting fences in 1970-73 and complete counts of adults were done in 1994-96.

State of the stock: Egg deposition in 1996 was 9.61 million eggs.

Accessible habitat: Not available until after review in 1997. Review will take into account distribution of parr and habitat.